

Long Beach Water Department's Bottled Water Program



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Presentation Outline

- Background
- Bottling Equipment
- Construction
- Permitting Requirements
- Water Quality Monitoring
- Policy/Programs
- Summary/Considerations

Presentation Outline

- 💧 **Background**
- 💧 **Bottling Equipment**
- 💧 **Construction**
- 💧 **Permitting Requirements**
- 💧 **Water Quality Monitoring**
- 💧 **Policy/Programs**
- 💧 **Summary/Considerations**

City of Long Beach, California

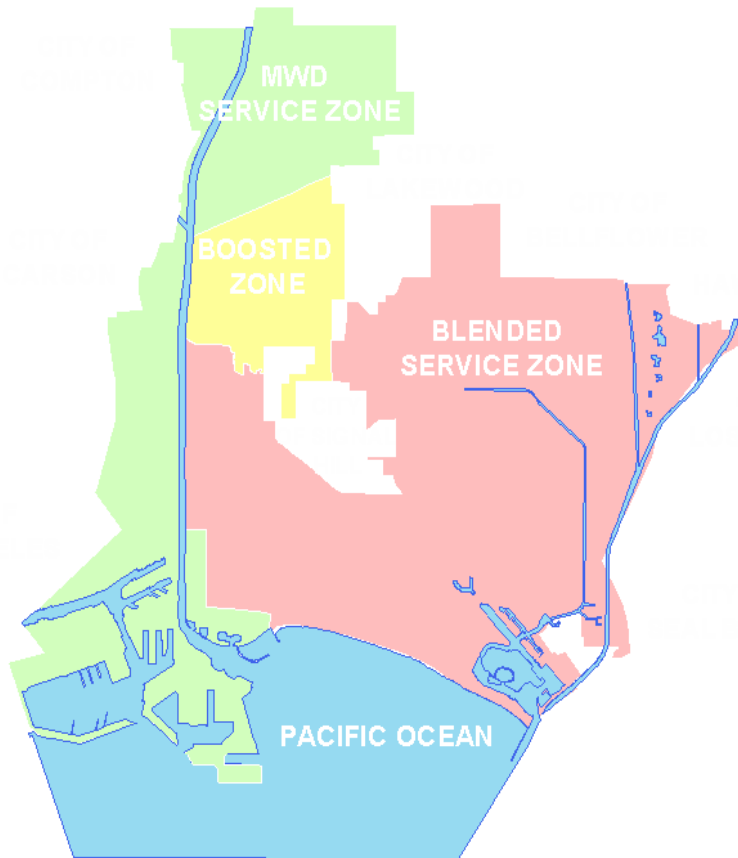


**Toyota Grand Prix of
Long Beach ... second
only to the Indianapolis
500 in attendance**

Queen Mary



Long Beach Water Department



Established in 1911

52 mi² area

**Service population of
487,100**

50% surface water

42% groundwater

8% reclaimed water

**Treats groundwater from 30
wells**

Bottling Program Introduction

- 💧 Initiated bottled water program in 1997
- 💧 Purpose
 - ◆ *commemorate completion of new 62.5 mgd Groundwater Treatment Plant*
 - ◆ *increase public awareness of the Long Beach Water Department*
- 💧 Policy
 - ◆ *Board of Water Commissioners decision to give away*
 - ◆ *organizations must be nonprofit, within City*
 - ◆ *no resale allowed*



Water Bottling Process

- “Old” Method (before 1999)
 - ◆ *water treated by conventional filtration prior to chlorination at Groundwater Treatment Plant*
 - ◆ *hailed by a commercial trucker*
 - ◆ *bottled by a private company*
- “New” Method (after 1999)
 - ◆ *water treated through nanofiltration membranes and ozonated*
 - ◆ *bottled and packaged through bottling plant*

Why Our Own Bottling Plant?

- 💧 Spend approximately \$40,000 annually on bottled water
 - ◆ *water provided to customers for interruption in service*
- 💧 Increased demand (distribute > 10,000 bottles/month)
- 💧 Provides confidence that bottled water may be provided to consumers in emergencies
- 💧 Better control and assurance on product water quality

How Did We Get There?

- Location

 - ◆ *housed in an empty bay of chemical containment area.*

- Equipment

 - ◆ *water treatment, water bottling*

- Construction

 - ◆ *cleanroom, enclosure*

- Permit

 - ◆ *bottled water regulated as food product*

 - ◆ *CDHS, Food and Drug Branch oversees all bottled water activities*

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Bottling Equipment

- Purchased from Electronic Liquid Fillers (ELF, LaPorte, Indiana) (now E-Pak Machinery)
- Able to fill and package 1/2 L and 1-1/2 L bottles
- Bottle and package up to 72, 1/2-L bottles/min (currently 48 bottles/min)
- Process started in late 1997
- Purchase and installation completed in August 1999
- Requires staff of 5 - 7 licensed treatment operators



Bottling Process

Well



NF Treatment



O₃



Rinser



Laser Coder Heat Sealer



Capper



Filler



Labeller



Turntable



Packaged



Nanofiltration Membrane Unit



- ♦ Osmonics NF membrane used for color/TOC removal
- ♦ 50 gpm permeate
- ♦ Operates at 60 - 70 psi

Ozonation Unit

- 💧 Applies up to 2 lb/day O₃
- 💧 Required for disinfection
- 💧 CDHS requires 0.1 - 0.4 mg/L at bottle



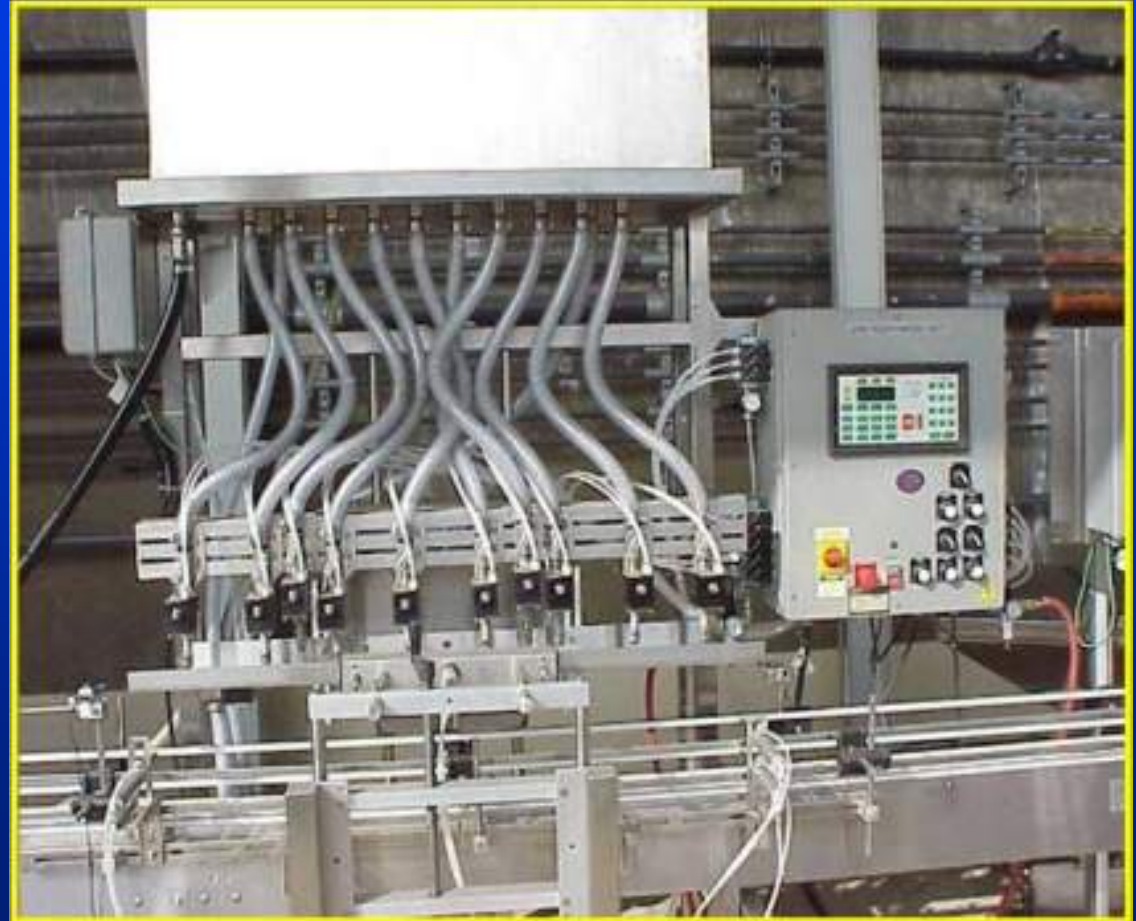
Bottle Rinsers



- Rinser not required
- Can use ozonated air or water
- Use same water as what is bottled for rinsing

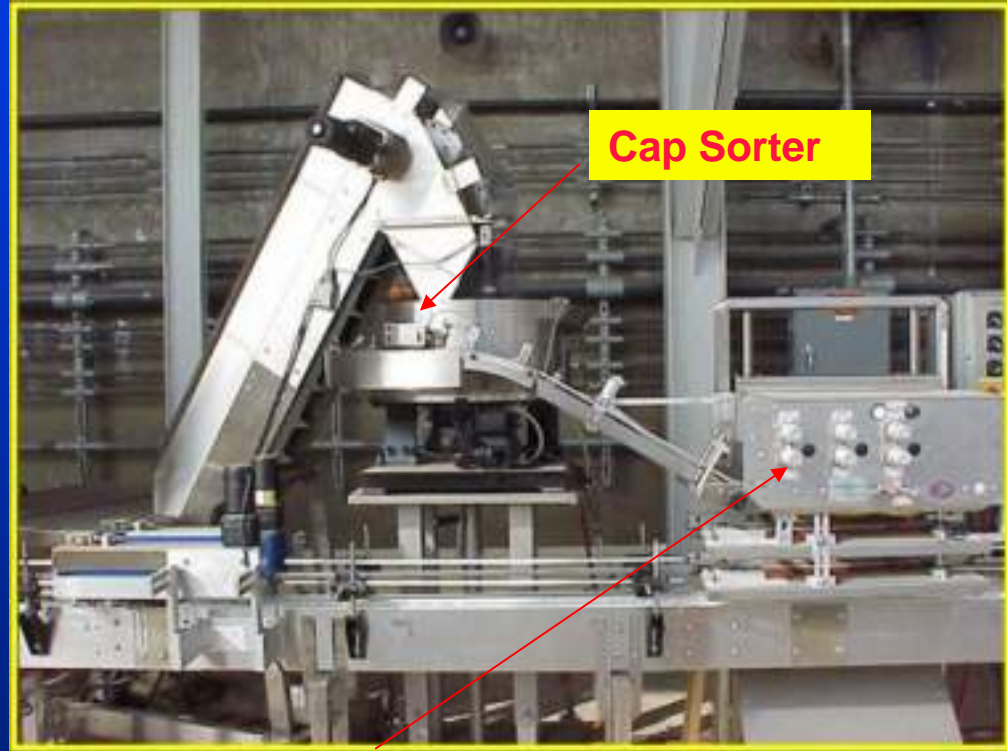
Bottle Filler

- 💧 10 head gravity fill
- 💧 Valves are air actuated
- 💧 Length of time determines volume filled



Bottle Sorter and Capper

- Sorts by vibration or rotary motion
- Uses air to orient caps
- Capper uses 3 spindles to locate and tighten caps



Cap Sorter

Bottle Capper

Bottle Sorter/Capper Inside Cleanroom



Induction Sealer



**Induction Foil
Sealer**

- Caps contain heat-sensitive foil
- Seals using microwave energy
- Provides for a tamper-proof enclosure

Bottle Labeler

- ⚡ Labels available on rolls up to 16"
- ⚡ Labels are pressure sensitive
- ⚡ Applied by friction as bottles travels past labels



Labeler

Ink-Jet Coder



- ♦ Applies ink to bottles
- ♦ Provides bottling dates, time, lot number information
- ♦ Have switched to laser-type

Off-Loading and Packing



- ♦ Bottles conveyed to rotary turntable
- ♦ Packed in 12- or 24-pack boxes
- ♦ Manual operations

Finished Product



Materials Needed



- 💧 Different options for labels, bottles, caps.....



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Construction

💧 Cleanroom

- ◆ *CDHS, Food and Drug Branch, requires bottling area to be enclosed*
- ◆ *protects product water and raw materials from contamination before the water is filled*
- ◆ *contains sophisticated air-cleaning system*

💧 Enclosure

- ◆ *keeps the rest of the bottling area clean*

Groundwater Treatment Plant



Preconstruction Bottling Site



Bottling Cleanroom



- ♦ **HEPA filter removes particulates to 10,000 μm**
- ♦ **Slight positive pressure inside, forcing air outside when doors open**



Enclosure Installed





General Costs

- 💧 **Equipment**

 - ◆ *NF Membrane Unit = \$208,000*

 - ◆ *Ozone = \$20,000*

 - ◆ *Bottling/Packaging = \$220,000*

- 💧 **Construction**

 - ◆ *Cleanroom = \$80,000*

 - ◆ *Enclosure = \$150,000*

- 💧 **Total = \$680,000**

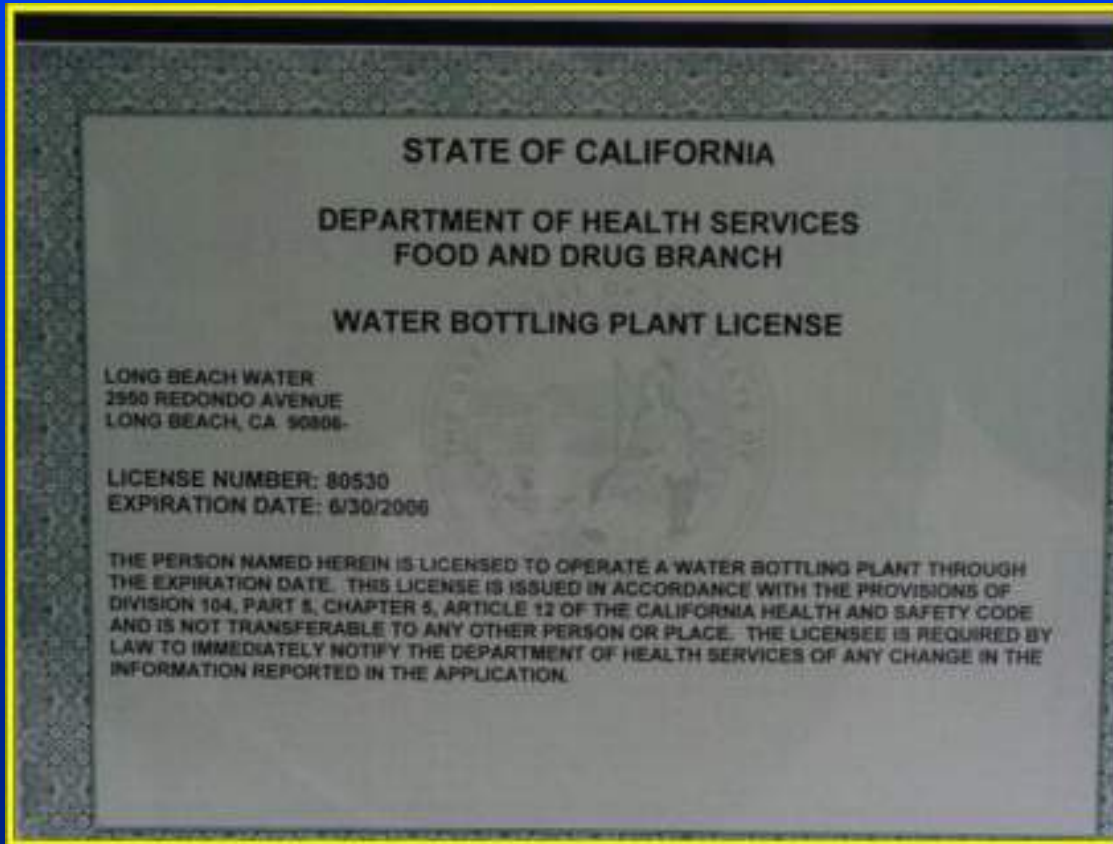
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Permitting Requirements

- Provide SOP to CDHS, Food and Drug Branch
- SOP must contain following elements:
 - ◆ *Source water quality*
 - ◆ *Bottling process*
 - ◆ *Cleaning procedures*
 - ◆ *Monitoring plan*
 - ◆ *Recall plan*
 - ◆ *Contact names/information*

Water Bottling Permit



- Effective for 12 - 18 months
- Contingent on water quality data and inspection results

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Monitoring Requirements

- 💧 Provide for weekly coliform sampling
- 💧 Provide for annual monitoring of bottled water to include following:
 - ◆ *Group 1 (Physical - 4)*
 - ◆ *Group II (Inorganics - 26)*
 - ◆ *Group III (Volatile Organic Compounds - 28)*
 - ◆ *Group IV (Synthetic Organic Compounds - 33)*
 - ◆ *Group V (Radioactivity - 6)*
 - ◆ *Group VI (Bacteriological - Coliform)*
 - ◆ *Group VII (Disinfection Byproducts/Disinfectant residuals - 7)*

Process Monitoring



- Use Hach DR2010 for measuring O₃ residual

- Ozone monitored a minimum of 3x/day

- NF unit water quality monitored daily

Ozone Records	
Reserve Lot 1 (Bottle numbers)	
Reserve Lot 2 (Bottle numbers)	
Reserve Lot 3 (Bottle numbers)	
Ozone (on-line), Time	2:07:50
Ozone (grab sample), Time	2:08:00
Ozone Tank Effluent	2:08:10
Filter Drain	2:08:20
Bottle	2:08:30
Ozone (on-line), Time	2:08:40
Ozone (grab sample), Time	2:08:50
Ozone Tank Effluent	2:09:00
Filter Drain	2:09:10
Bottle	2:09:20
Ozone (on-line), Time	2:09:30
Ozone (grab sample), Time	2:09:40
Ozone Tank Effluent	2:09:50
Filter Drain	2:10:00
Bottle	2:10:10
Ozone (on-line), Time	2:10:20
Ozone (grab sample), Time	2:10:30
Ozone Tank Effluent	2:10:40
Filter Drain	2:10:50
Bottle	2:11:00

Sample Water Quality Data

Group	Description	Parameter	MCL (mg/L)	LBWD (mg/L)
I	Physical	TDS	500	72
		Color	15	ND
II	Inorganic	Lead	0.005	ND
		Copper	1	ND
III	VOC	MTBE	0.005	ND
		Benzene	0.001	ND
IV	SOC	Dioxin	3×10^{-8}	ND
		Atrazine	0.003	ND
V	Radioactivity	Gross alpha	15 pCi/L	<3
VI	Bacteriological	Coliform	1 cfu/mL	0
VII	D/DBPs	TTHMS	0.01	ND
		Bromate	0.01	ND

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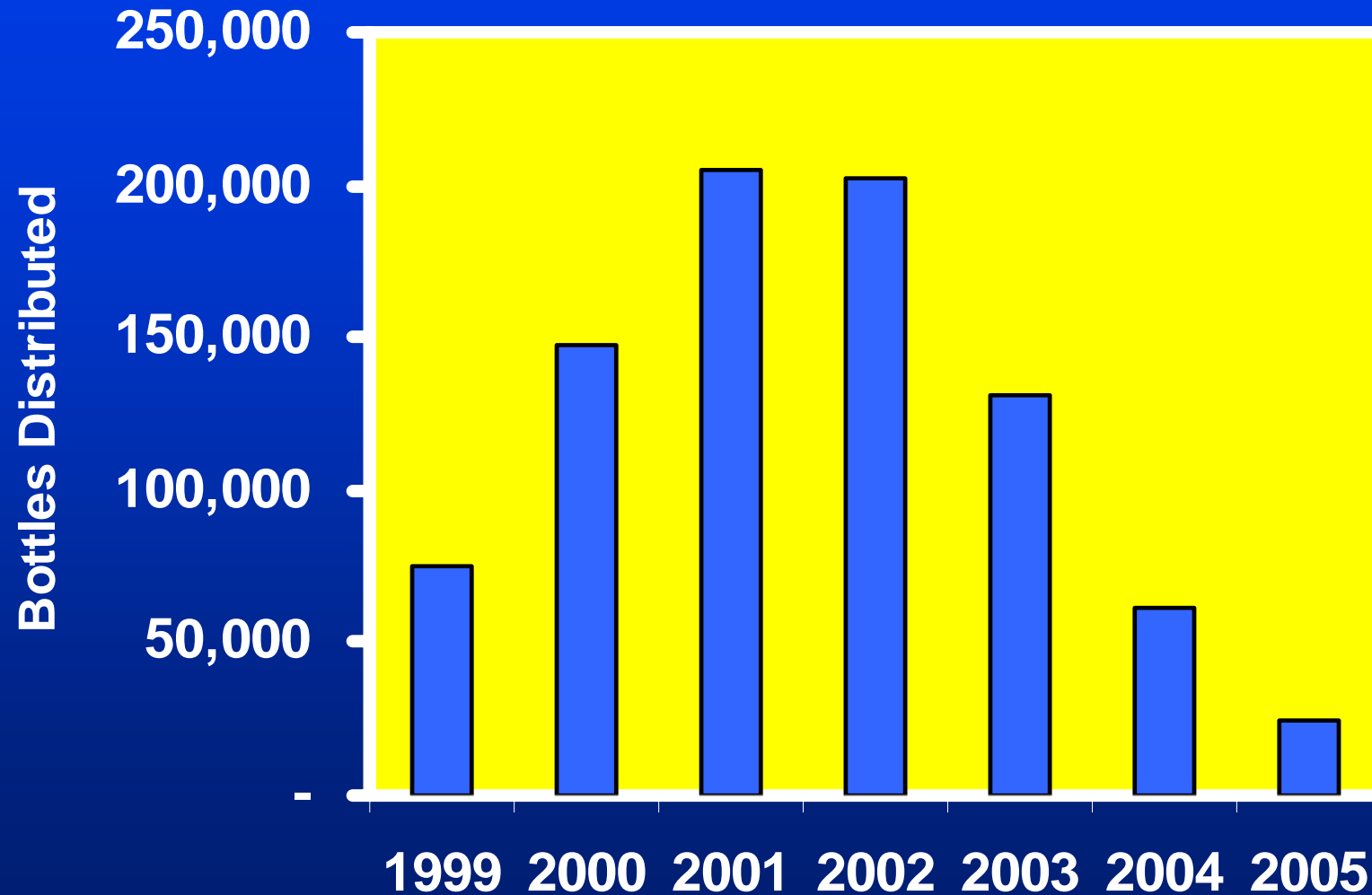
Bottled Water Policy

- Evolving process
- Provides fixed allocation for Board and City Council use
- Large users, including Police and Fire Departments, receive annual allotments
- Provided to Long Beach non-profit groups and events that raises awareness of Water Department and City
- As a rule, no deliveries, must pick up

Bottled Water Approval Form

- 💧 Includes date and time of pick up
- 💧 Event and organization name
- 💧 Expected number of attendees
- 💧 Desired number of bottles

Bottled Water Provided by Year



Emergency Water for Schools

- 💧 LBWD has aided LBUSD on water quality issues
- 💧 Performed monitoring at LBUSD drinking fountains
- 💧 Emergency water could be an issue



Photo by Elisa Madina and Michelle Hicks

Emergency Water for Schools (cont'd)



- **Stored in 55 gallon drums**
- **Quality/maintenance concerns**
- **Bottled water requested**
- **20,000 of 1.5 L bottles District-wide**
- **Replace and restock annually**

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Summary

- Bottled water program in place since 1997 (8 years)
- Evolved from 50,000 bottle/yr to ~250,000 bottle/yr program
- Costs for 1/2-L bottle ~ \$0.40, 1-1/2 L bottle ~\$0.70
- Delivery is most labor intensive part of program
- Have perform limited contract services for other municipalities

Considerations

- Why - purpose for program (dictates policy)
- How - partner with existing bottler or own bottling plant
- Where - plant location, product storage
- What - equipment needed, materials required, procedures followed
- Who - personnel required